

GEORGIA INSTITUTE OF TECHNOLOGY

OFFICE OF RESEARCH ADMINISTRATION

RESEARCH PROJECT INITIATION

Date: March 17, 1972

Project Title: Consulting Services

Project No: E-20-621

Principal Investigator Dr. M. R. Carstens

Sponsor: Trans-Southern Pipeline Corporation; Houston, Texas

Agreement Period: From February 1, 1972 Until June 1, 1972

Type Agreement: Letter dated February 16, 1972 (Fixed-Price).

Amount: \$2,070.00

Reports Required: Monthly Activities Reports

Sponsor Contact Person (s): Mr. Donn Leva  
Trans-Southern Pipeline Corporation  
P. O. Box 1396  
Houston, Texas 77001

Assigned to: School of Civil Engineering

COPIES TO:

Principal Investigator

School Director

Dean of the College

Director, Research Administration

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Project File

Other \_\_\_\_\_

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GEORGIA INSTITUTE OF TECHNOLOGY  
OFFICE OF RESEARCH ADMINISTRATION  
RESEARCH PROJECT TERMINATION

Date: July 20, 1972

Project Title **Consulting Services**

Project No: **E-20-621**

Principal Investigator: **Dr. M. R. Carstens**

Sponsor: **Trans-Southern Pipeline Corp.; Houston, Texas**

Effective Termination Date: June 1, 1972 (by Agreement)

Clearance of Accounting Charges: June 30, 1972

Grant/Contract Closeout Actions Remaining: **Final Invoice**

Assigned to: School of Civil Engineering

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Other \_\_\_\_\_

April 1, 1972

Mr. Donni Leva  
Trans-Southern Pipe Line Corp  
P.O. Box 1396  
Houston, Texas 77002



Dear Donni:

I just realized that I was obligated to submit a monthly activities report on my consulting activities. While I have kept track of the clock time I am confident the hours spent far exceed the contractual obligation of about 4 hours per week. The following work has been accomplished during the months of February and March which is in the furtherance of TUBE-EXPRESS.

a. Prepared a paper entitled "Capsule Transport in Pipelines" to be presented in Atlanta in June at the AGA - IGT Conference on Natural Gas Research in

b. Prepared a set of notes entitled "Design One Based on Minimum Power". This set of notes is dated February 16 and 17, 1972.

c. Prepared a set of notes entitled "TUBE-EXPRESS A Review". This 9-page set of notes is dated February 5 and 6, 1972.

d. Prepared a set of notes entitled "TUBEXPRESS as a Conveyor-Belt System". This 17-page set of notes is dated February 12-19, 1972.

e. Prepared a document entitled "TUBEXPRESS Design -- A Design Manual for Licensees of TUBEXPRESS." This 15-page, undated document was transmitted to B.E. Freeze on March 26, 1972.

f. Plans were made for continued research and development work. The proposed plans were sent to you in the form of <sup>(a)</sup> proposal for utilization of my services as a consultant.

g. Conducted a 1 1/2-day seminar for Messrs. Freeze and Stonedipher about design of TUBEXPRESS.

h. Design work on the working models for Transpo'72. The two systems were designed sufficiently so that the pump requirements could be established. A search for pumps was begun and has ended with the design to install two in-line capsule-booster pumps in each system. Each booster pump will be powered by <sup>(b)</sup> a centrifugal fan which was installed on the 1960-61 model, Chevrolet, Corvair in the forced air system through the gas heater. The performance characteristics of this fan were determined by laboratory tests and were found to be quite satisfactory. This fan is extremely quiet.



During the past week, I visited a short time with Bob Stonecipher. He is doing some good work by looking at the effect of changing one variable at a time. His work is indicative that we may wish to use higher velocities than the velocity associated with minimum power required because the number of pumps required increases as the air velocity in the pipe line is decreased. I hate to drag anchor but I am ~~very~~ convinced that we are ~~still~~ too ignorant about TUBEXPRESS to consider issuing a design manual for sub-licensees. Bob Stonecipher<sup>(is)</sup> using the right approach in his detailed look at systems.

Before Bob Stonecipher does too much more work I would like to see him incorporate one more refinement into his computer program, namely, an adjustment for the efficiency of an inline capsule booster pump. Instead of using the overall efficiency as 30%, he should use  $Q_j = VA/2$  and

$$\text{power input to a fan} = \frac{(\rho V_j^3 / 2)(VA)}{1.32} \quad \checkmark$$

or

$$\frac{\text{power output}}{\text{power input}} = 1.32 \left( \frac{V}{V_j} \right) \left( \cos \beta - \frac{V}{V_j} \right)$$

Sincerely yours

Bob

cc: WMS

HB

M. R. Christensen

2394 Lively Trail, N.E.  
Atlanta, Georgia 30345  
May 10, 1972

Mr. Donn Leva, Manager  
Trans-Southern Pipeline Corp.  
P.O. Box 1396  
Houston, Texas 77001



Dear Donn:

This letter constitutes an activities report for the month of April as per agreement in our project E20-621. Two activities were carried on during April.

First, I directed the fabrication of two models for the Transp '72 exhibit. Some of this work involved my professional talent such as pump selection and design but the majority of the work involved duties as a project director (Project E20-620). These duties involved arranging for skilled craftsmen to fabricate the models, locating and ordering supplies, and so forth.

Second, I analyzed the data from the pump tests performed by the C.E. 320 students during the spring quarter 1972. This work is the background information upon which a complete report about in-line capsule-booster pumps with upstream withdrawal is to be prepared.

Incidentally we have had an additional problem arise with the centrifugal blowers used in the Transp models. Chevrolet Parts Division has completely discontinued the manufacture of the gas heater blowers for the 1961-65 Corvairs. My first information was that the impellers and motors could be ordered. An order for 3 motors and 3 impellers was placed but cannot be filled. As a consequence I recommend that you canvas the auto wrecking

and salvage yards of Houston to obtain additional spare units for the Transpo models. A three-view drawing of the centrifugal blower (1/2 scale) was sent to you previously. By the way, one of the motors sent with the Transpo models was borrowed from Homer Bates. He had a complete blower which he did not intend to donate to the project. As of now the Transpo models are powered with four of these discontinued blowers and one spare complete unit has been shipped. Because the centrifugal blowers are becoming a collector's item, care should be exercised to be certain that the voltage drop across the drive motors is limited to less than 20 volts.

You and Pesanelli may be slightly stunned to see the selected design of the cars for the circular conduit of the Transpo model. In order to be certain that the attitude of the cars was correct, the body is suspended so as to assume the proper attitude regardless of the movement of the wheels and end plates. Due to the shortage of time, we could not afford to gamble. Bobby Freeze may wish to consider this new design in his design work for real systems.

My impression is that you are over reacting to my request that I be absolved from professional responsibility in possible suits involving Tubexpress. Regardless of how safe and well designed our systems are some damn fool will figure out a way to get hurt. There are too many lawyers so that some have to make a living by gambling on damage suits. As I see it, I could be sued also. Couldnt one <sup>of</sup> your lawyers alter your standard statement as exemplified by the 6th condition in an earlier agreement between us dated June 25, 1971 to protect me as well as protecting Trans Southern?

If this simple alteration is not possible I am agreeable to obtaining reasonable additional insurance. My current insurance is all contained within a homeowner's policy with the Cincinnati Insurance Company. In II 1 E comprehensive personal liability in the amount of \$50,000 and in II 2 F medical payments of \$500 for each person are part of the basic policy and endorsement. In addition I pay \$4 per year to have the coverage II E and II F apply to business pursuits. My automobile insurance is an endorsement on the homeowners policy. I am insured for \$50,000 for each person and \$100,000 for each occurrence on our cars for bodily injury liability. The property damage liability is \$10,000 for each occurrence. My insurance agents are Burdett, Miles, and McGee, Incorporated, 134 Peachtree Street, N. W., Atlanta, Georgia 30303 [Phone (404) 521-1101].

As the result of Gordon Davis' visit, I plan to be at the exhibit from 9 AM to 12 N. on May 30, 31, June 1 and 2. I understand that you have applied for an exhibitor's pass for me and that you will obtain a one-day trade ticket for Viv for May 30. I feel certain that one day will be enough for her. If you have spare beds on the nights of May 30, 31, and June 1 we might impose on you.

Horner is about worn out with the long hours and the deadline pressure. I suggested that he take some time off after both models are transferred to your care. I will get his telephone number where he can be reached in case of an emergency.

I should have a fairly accurate figure on the cost of the models by the end of May.

CC: HB  
WMS

Sincerely yours  
Edw.  
M. R. Carstens